

Dave's Notes on How to Pick and Install Moses Magnets

PAIRS OR SINGLES - I've tried using the magnets in pair, then with a magnet and washer, and then back to the pairs. The washer wasn't lighter because I had to go to a bigger magnet to get the same attraction level. The round magnets are easier to work with than the square but the square can really control alignment as well as fit linear areas. I like using the 1/32" thick more than the 1/16" as the same diameters are half the weight.

SELECTING THE RIGHT MAGNETS - You are only limited by your imagination on their application and selection. I've used smaller ones mounted on the trailing edge with a dowel pin up front for locating the wing. On another plane with a 32" wingspan I used four magnets at each corner where the wing met the fuselage and it literally just snaps into position. One thing you are trying to do is allow for the wing to slide unimpeded towards the rear and either side of the fuselage so that it comes off if the wing hits the ground first. This really saves a lot of wear and tear to the model. I'll describe how I started doing this and then how I do it now in the "How to install Moses Magnets".

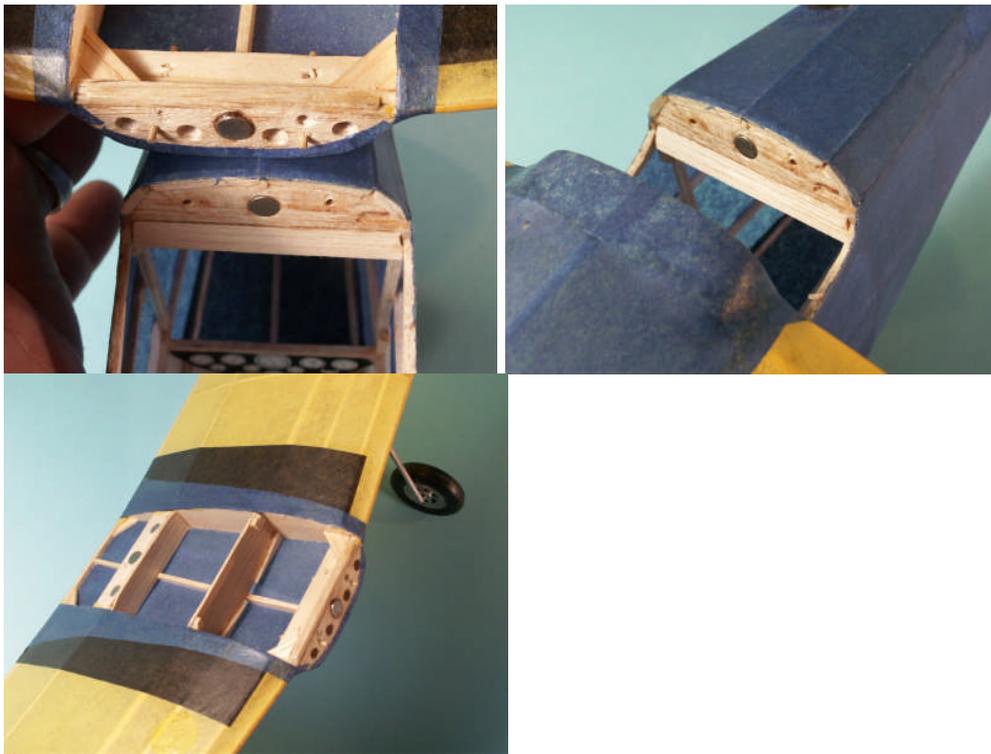
As for the size, my concern is going to be the amount of force you apply with launching as to how strong a magnetic pull you need. The forces can be magnified by using more magnets. There is no magic formula for what works, every plane is different and so sometimes a little experimentation is needed.

Here are a few specific examples of where I've used magnets on my planes...I've not tried using them on a plane where the wing is mounted to the fuselage by a butt joint as this would take extreme care and time to assure exact placement so the wings were perfectly aligned. Any mistake here and the plane will not have good flight characteristics. In all applications of the magnets you need to make sure that the parts can be attached in a repeatable position every time.

- **FF97, the Korda Victory** wing just snaps into place resting flat on top of the fuselage using only the pull of the magnets to hold it in place for the entire flight - works well. A pair of M12s mounted under the main spar and a pair of M10s mounted under the trailing edge in line with the fuselage sides. A pair in this instance represents 4 magnets, 2 on each side and equidistant of the fuselage's centerline.

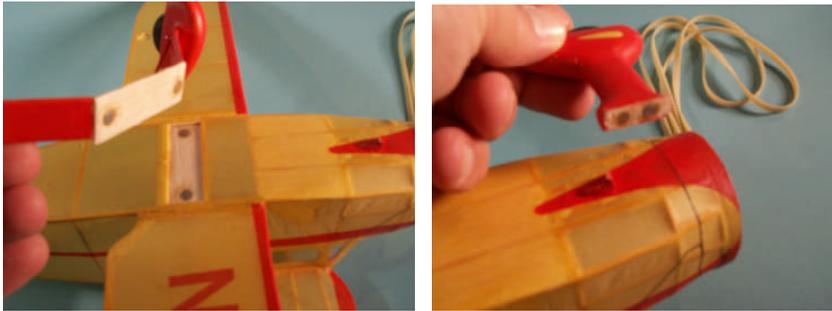


- **The 35" Fairchild PT-19, kit FF6** uses a combination of locator pins from my initial attempt and magnets. 2 pairs were mounted on the rear spar on each side of the fuselage with only pins on the leading edge. This was not quite enough for comfort as the wing always came off every time it touched down. I later added a pair on the front of the leading edge with the seam going vertical holding the wing and pins more firmly into the fuselage. This felt better when launching the plane, the wing being more secure. On the PT-19 - one set of M4 magnets on the centerline facing forward between the old locator pins still in use. On top the wing (this is a low winger) 2" in front of the trailing edge I put a pair of M4s on each side of the fuselage to wing with a stronger M10 mounted on the centerline. I use 2 loops of 1/4" with an 11" prop to fly this at Wawayanda with the breeze and no trouble and flights of 80 to 227 seconds. To install these in the low wing plane I had to modify the fuselage to accept a single wing. I chose this over trying to get perfect alignment of separate wings mounted on each side of the fuselage - fought this battle too many times and lost.



- **Waco N, Kit PD05**, I used them to hold the tricycle landing gear on and virtually eliminated the damage from landing normally associated with this configuration. I also used magnets to hold the nose block in place on this plane. Four mounted at corners of an imaginary square. This is a wonderful feature that allows using 1/32" thick magnets as shims. The little weight associated with this practice is not a problem since this is where you usually want the weight.

The landing gear



The magnets are imbedded into the structure, the nose gear magnets are hidden under the tissue and the main gear recessed into a small detent so it is flush on the outer surface. I used fine fishing line to hold the parts to the fuselage. Doing this technique especially on a tri-cycle landing gear eliminated the breakage under the plane without having to add a ton of weight. Also transporting becomes easier because you take the landing gear off and set the plane flat requiring less height inside the box.

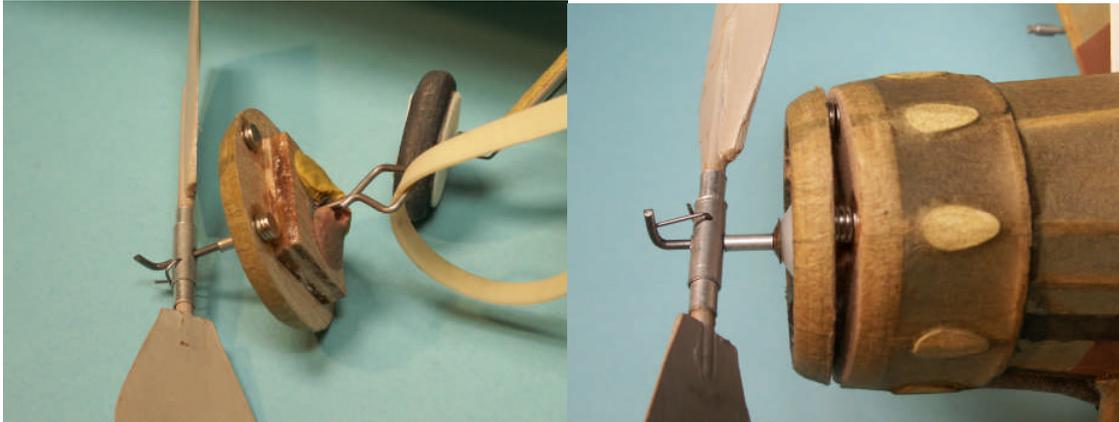


The nose block



- FF98, the Gloster Gladiator I used them to hold the nose block on and seen in these pictures allowed for shimmying. At judging time in competitions I can

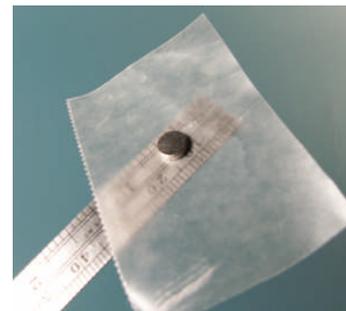
remove the magnets and hide the seam but quickly return them for those pesky windy days where more down thrust might be needed.



WHAT GLUE TO USE? I find the use of 5 minute epoxy the best for holding the magnets in place. I've done this using Slo-Zap instant glue and with multiple magnet locations all at one time but you need to get some experience and comfort doing this first. The instant glue sometimes lets loose on landing shock as it is hard and brittle where the epoxy is more rubbery. Test your wax paper to make sure it doesn't stick to the adhesive or find something better before you put any to your model.

INSTALLING MOSES MAGNETS – I've tried a number of methods and after a number of iterations refined it down to this point. I'm sure there are more refinements to be made and will update this in time.

1. Mark the location - First use a ruler to mark the locations where the magnets will be placed. Consider balance of the plane by locating equidistance from the centerline of the fuselage. Also consider the impact of the weight relative to the center of gravity so you do not end up having to add additional nose or tail weight to balance the plane.
2. Make the first hole for the magnet - I use a cork borer to make round holes in the balsa creating a cut out depression at the location where the magnet will go. Make the depression oversize, 1/32" to 1/16" bigger in diameter, and make sure it is deep enough so the top of the magnets will sit flush with the outer surface. Only make one hole on one side to start.
3. Glue the first magnet in the hole - Take a small square of waxed paper and place it between your magnet you plan to use and a flat 6" steel ruler. The magnet holds it the waxed paper in place and will keep the epoxy from sticking to the ruler. The ruler is how you will hold the magnet flush with the outer surface of the hole while the epoxy dries. Mix up some 5 minute epoxy, put a drop into the hole, and position the magnet in the hole. The beauty of epoxy is until it cures the



epoxy allows for the magnet to move for positioning. After the epoxy hardens you can remove the ruler but leave the wax paper in place.

4. Complete installing the other magnets on the same half - Now repeat this for the rest of the magnets that will be on the same half of the two parts to be held together.
5. Mark the hole locations on the other half to be held by the magnets - Now you are going to mark the positions on the matching half to be held to the plane by the magnets. Place a matching magnet on each of the magnets glued in place. If the wax paper has come off then put another piece in place as you are going to need this to keep the glue from attaching to both halves of the plane. Now push the airplane part that will be held in place by the magnets up against these magnets sticking out. This creates a light mark on the balsa so you no exactly where to place the matching magnets.
6. Make holes at each mark on this matching part like in step 2.
7. Glue the magnets into the matching half - Test fit the parts and be happy with the joint before putting any glue in. Make any final adjustments if needed. Mix up some more epoxy and put a drop in each of the remaining holes. Now carefully slip the matching part into position with the magnets slipping into the holes. Make sure the matching part is where you want it before the epoxy cures. Once it is hardened you can pull apart the matching parts because the wax paper keeps them from sticking together while the glue cures.
8. Final touches - any gaps in the glue around the magnet can be filled with some more epoxy to give the strongest bond.

HOW MANY TO BUY? Well there is still a bit of a learning curve but you can start out with some 1/8" and 3/16" diameter magnets for smaller ships and 1/4" to 3/8" for the larger models. Always get magnets in pairs, and think about how you intend to hold the wing on to the fuselage. Specifically the magnets' location points and quantity, and possibly additional balsa to hold the magnets. Another thought is do you want to use these for shims? I've used the 1/32" thick magnets for changing thrust alignment on the nose block and the angle of the wing.

Now go think about where else you might put these attractive wonders to use - [Dave Niedzielski](#)

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